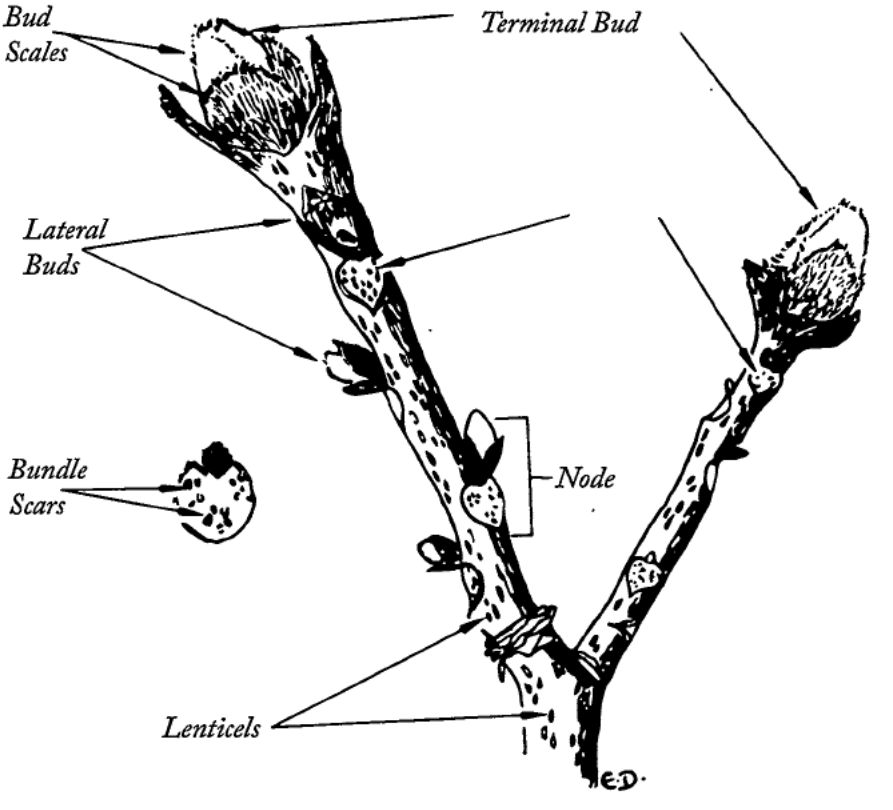


A KEY TO Missouri Trees in Winter

AN IDENTIFICATION GUIDE

Jerry Cliburn & Ginny Wallace



Winter Twig Characteristics

Front cover: River Birch Bark by Jim Rathert

A KEY TO

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Revised 2021

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INTRODUCTION

For many of us, the approach of autumn signifies the end of plant identification for another year. The herbaceous plants die back and disappear, and shrubs lose their leaves. Without leaves, all the trees seem to look alike. However, closer examination of twigs reveals some distinct differences. This key has been designed to use these differences so you can easily identify a tree.

This key can be used beyond the winter. Twig and bud features are reliable characteristics that you can use throughout the year, with the exception of three to four months in late spring and early summer when new growth occurs and next year's buds are being formed.

This key includes most trees native to Missouri and some shrubs that reach a large size. A few trees that are not native to the state but have been widely planted are included — especially where they have escaped cultivation. Other ornamentals are not included.

This key is designed for use primarily in the country. However, as many native trees are planted as ornamentals, the key will also be useful in cities and towns. Each native species is accompanied by a shaded distribution map showing its natural distribution in the state. The map does not reflect plantings around cities and towns; so, if you use the key in an urban environment, the maps should be disregarded. An illustration of the twig, and in some cases the fruit or leaf, is included for each species.

STRUCTURAL FEATURES

Buds are plainly visible on most twigs and represent a resting stage. They are actually a minute or embryonic branch bearing minute leaves or flowers, or sometimes both (mixed buds). Flower buds usually can be distinguished from leaf buds by their large size and usually rounder appearance. In most cases, buds are protected by one or more scales. However, sometimes the buds lack scales or are naked. In naked buds, the first pair of leaves often curls inward, protecting the inner leaves. Sometimes, this may give the appearance of bud scales, so take care when you determine the presence or absence of bud scales. Occasionally, certain trees will appear to lack buds all together. The buds of these trees are usually embedded in the twig and will emerge in the spring.

Buds occur terminally and laterally on the twig. True terminal buds occur directly on the end of the twig. Once they are formed, growth ceases on that twig until the next growing season. Some species lack a true terminal bud; however, a terminal bud may appear to be present. This is actually a well-developed lateral bud near the end of the twig, which has assumed a terminal position. This bud often will appear slightly lopsided and will have only one leaf scar directly below it. Also, the twig will have a zigzag shape as opposed to being straight. If there is any question about whether the bud is truly terminated, examine several twigs from the tree. Axillary, or lateral, buds occur in the axial, or upper angle between the leaf and stem, and are usually smaller than terminal buds. Lateral buds can be:

- **Alternate:** occurring singly along the twig
- **Opposite:** occurring in pairs along the twig
- **Whorled:** occurring in groups of three along the twig

Buds near the tip of the twig are sometimes crowded together, appearing opposite when they are actually alternate. Examine the arrangement of the buds all along the twig to avoid confusion.

A leaf scar is the corky piece of attachment left when the leaf falls in autumn. One to several small dots or lines called bundle scars may be seen on the surface of the leaf scar. These indicate where the cells containing sap entered the twig from the leaf. They are often difficult to see without a hand lens.

Stipules are small leaflike structures occurring in pairs at the base of the leaf in some trees. These generally fall off during the summer and leave small, narrow stipule scars on the twig.

Lenticels are small, sometimes warty, dots scattered over the twig. These are actually patches of loose tissue that let air into the tissue beneath.

Pith is the central cylinder of tissue in the twig and usually differs in color and texture from surrounding wood. In cross sections, it may appear round, oval, triangular, star-shaped, or variously lobed. When cut lengthwise with a sharp knife, the pith may show one of a number of characteristics. The pith can take various forms:

- **Continuous:** solid and uniform throughout
- **Diaphragmed:** solid and transversed at short intervals by narrow bands of darker tissue
- **Chambered:** hollow and interrupted by transverse partitions

HOW TO USE THE KEY

In order to successfully use this key, you will need a 10X hand lens, a sharp pocket knife, and a ruler. For convenience, a ruler is printed on the inside back cover.

Select a typical twig of the tree you wish to identify. Choose a twig with vigorous growth and healthy buds. Avoid abnormal twigs. Note whether any thorns or spines are present on the trunk or branches. Often dried fruits or leaves may be found on the tree or on the ground around the tree. These may be useful in identification, especially in the oaks.

The key consists of a series of couplets, or alternative choices. One, and only one, of the statements in a couplet will be correct for the twig being identified. Begin with couplet number one. If no leaves are present, proceed to couplet one, Group B. Continue to choose one statement from each couplet considered. For example, in Group B, if the twig is not as described in the first half of couplet one and leaf scars are present, proceed to couplet two. If leaf scars are not whorled, but are alternate or opposite, skip to number four. At couplet four, if leaf scars are alternate, proceed to Number 23. Continue in this manner until you have identified the twig.

The key is divided into three major groups:

- **Group A:** Evergreens, page 5
- **Group B:** Deciduous, page 8
- **Group C:** Oaks, page 34

If the twig in question is known to be from an oak, you can save time by proceeding directly to Group C. However, if there any question about which major group is correct, start at the beginning.

ACKNOWLEDGMENTS

Authors: Jerry Cliburn and Virginia L. Wallace

The authors wish to thank Greg Hastings and Ramon Gass for their valuable assistance.

The majority of the twig and leaf illustrations were taken from *Forest Trees of Illinois* by Robert H. Mohlenbrock, illustrated by Mariam W. Meyer and Freeda J. Burton, and published by the Division of Forestry, Illinois Department of Conservation. Thanks to the Illinois Department of Conservation for permission

to use this material. Thanks to Ann Grotjan, with assistance from Tim Smith, for providing the twig and fruit illustrations not available from the Illinois Department of Conservation. Virginia L. Wallace provided illustrations in the key. The winter twig characteristics illustration was provided by Edgar Denison.

KEY TO MISSOURI TREES IN WINTER GROUPS

- **Green leaves present during winter:** Group A, page 5
- **Green leaves absent during winter:** Group B, page 8
- **Oaks:** Group C, page 34

GROUP A: EVERGREENS

1. Leaves in bundles, needlelike 2

1. Leaves solitary, scalelike, needlelike, or shiny with wavy edges, the veins ending in sharp spines 8

2. Leaves in bundles of five ..... **Eastern White Pine** (*Pinus strobus*) (not native) Fig. 1

2. Leaves in bundles of two or three 3

3. Leaves in bundles of two 4

3. Leaves in bundles of three 7

4. Most or all of the leaves less than 3 inches long, usually twisted..... 5

4. Most or all of the leaves longer than 3 inches, rarely twisted 6

5. Leaves up to 1½ inches long; sheath at base of leaves no longer than ⅛ inch ..... **Jack Pine** (*Pinus banksiana*) (Not native) Fig. 2

5. Leaves 2–3 inches long; sheath at base of leaves at least ⅓ inch long ..... **Scotch Pine** (*Pinus sylvestris*) (Often used for Christmas trees) (Not native) Fig. 3

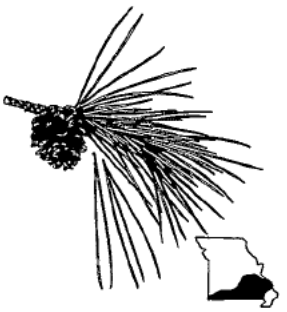
1. White Pine (2) **2.** Jack Pine (5) **3.** Scotch Pine (5)



6. Leaves mostly less than 5 inches long; cone scale with a small spine ..... **Shortleaf Pine** (*Pinus echinata*) (Native) Fig. 4

6. Leaves mostly more than 5 inches long; cone scale without a small spine ..... **Red Pine** (*Pinus resinosa*) (Not native) Fig. 5

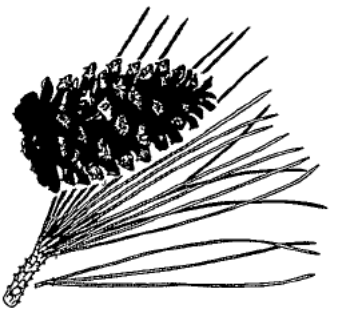
4. Shortleaf Pine (6, 7)



5. Red Pine (6)



6. Loblolly Pine (7)



7. American Holly (8)



8. Eastern Red Cedar (9)



9. Ashe Juniper (9)



7. Leaves mostly less than 5 inches long; sheath at base of leaves about ¼ inch long ..... **Shortleaf Pine** (*Pinus echinata*) (Native) Fig. 4

7. Leaves mostly more than 5 inches long; sheath at base of leaves about 1 inch long ..... **Loblolly Pine** (*Pinus taeda*) (Not native) Fig. 6

8. Leaves of two types, some scalelike and about ⅛ inch long, some needlelike and about ⅓ inch long 9

8. Leaves of one type; green, leathery, shiny with wavy edges; the veins ending in sharp spines ..... **American Holly** (*Ilex opaca*) (Native to Crowley's Ridge in Southeast Missouri; planted elsewhere) Fig. 7

9. Center of stems reddish or copper colored ..... **Eastern Red Cedar** (*Juniperus virginiana*) Fig. 8

9. Center of stems brown ..... **Ashe Juniper** (*Juniperus ashei*) (Found only in extreme southwest Missouri) Fig. 9

GROUP B: DECIDUOUS

1. Scars resembling leaf scars alternating with numerous, globose buds along length of twigs; terminal bud absent. Twigs slender, reddish-brown. Large trees with base of trunk often swollen, "knees" usually present if growing in water ..... **Bald Cypress** (*Taxodium disticum*) (Native to swamps in Southeast Missouri; planted throughout the state) Fig. 10

1. Leaf scars present, plants not as above 2

2. Leaf scars in whorls of three 3



2. Leaf scars in alternative or opposite 4

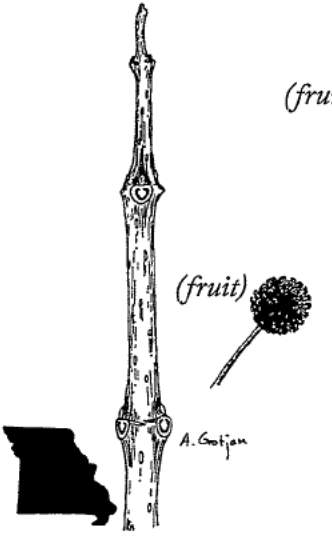
3. One bundle scar. Shrub in wet low areas; fruit is a small globe-shaped cluster of seeds ..... **Buttonbush** (*Cephalanthus occidentalis*) Fig. 11

3. Many bundles of scars. Large tree; fruit is a long narrow beanlike capsule. Distinctive craterlike leaf scars, with a ring of bundle scars ..... **Catalpa** (*Catalpa spp.*) Fig. 12

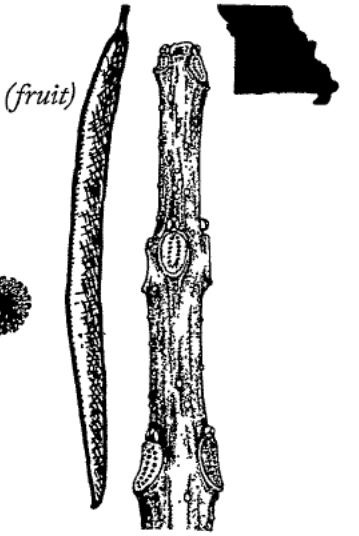
10. Bald Cypress (1)



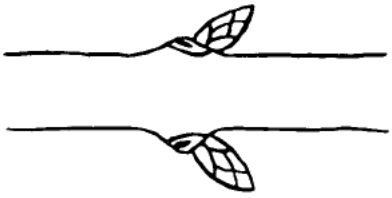
11. Buttonbush (3)



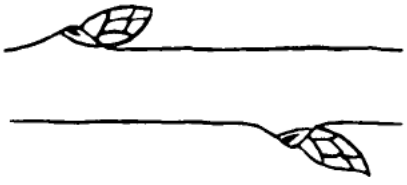
12. Catalpa (3)



4. Leaf scars opposite 5



4. Leaf scars alternate 23



5. Bundle scar one 6



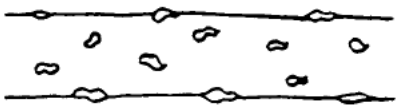
5. Bundle scars of three or more 8



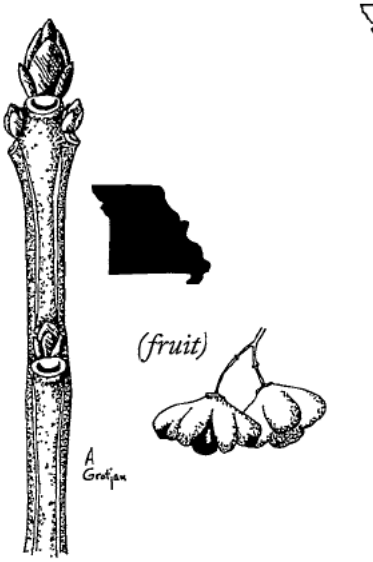
6. Pith spongy, somewhat greenish; twigs green, remotely four-winged when vigorous. Fruit is a four-lobed capsule with scarlet-colored seeds ..... **Eastern Wahoo** (*Euonymus atropurpureus*) Fig. 13

6. Pith continuous, white 7

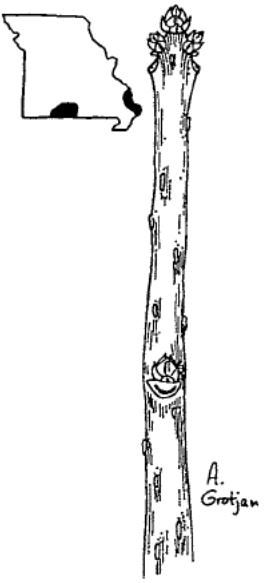
7. Twigs more than 1/16 inch thick; warty or corky lenticels prominent ..... **Fringe Tree** (*Chionanthus virginicus*) (In Missouri, found naturally in the extreme south) Fig. 14



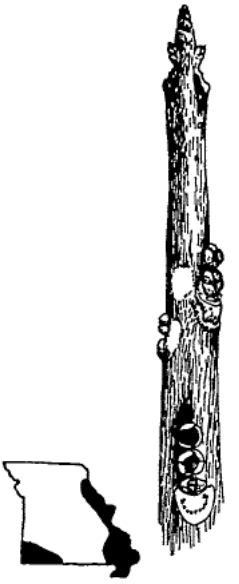
13. Eastern Wahoo (6)



14. Fringe Tree (7)



15. Swamp-privet (7)



7. Twigs under 1/16 inch-thick with raised leaf scars ..... **Swamp-Privet** (*Forestiera acuminata*) (In Missouri, limited to the eastern edge and southwest) Fig. 15

8. Bundle scars of usually nine or more..... 9

8. Bundles scars of usually three to seven (sometimes nine in Boxelder) 12

9. Twigs four-sided, with four corky lines on young growth ..... **Blue Ash** (*Fraxinus quadrangulata*) Fig. 16

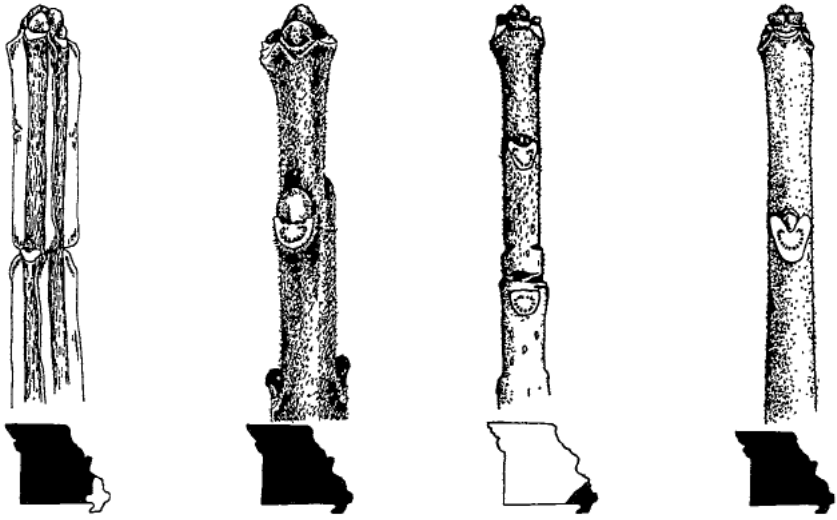
9. Twigs not four-sided, no corky lines..... 10

10. Leaf scars deeply noted at the top.....11



10. Leaf scars more or less straight across the top, shield-shaped, may sometimes appear slightly notched ..... **Green Ash** (*Fraxinus pennsylvanica*) Fig. 17

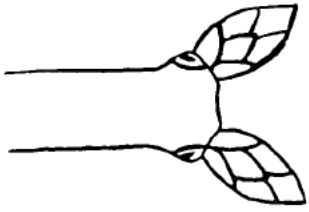
16. Blue Ash (9) **17.** Green Ash (10) **18.** Pumpkin Ash (11) **19.** White Ash (11)



11. Twigs with conspicuously large lenticels. Trunks swollen at the base ..... **Pumpkin Ash** (*Fraxinus profunda*) (In Missouri, found naturally in the southeast) Fig. 18

11. Twigs with inconspicuous lenticels. Leaf scars horseshoe-shaped. Trunks not swollen at the base ..... **White Ash** (*Fraxinus americana*) Fig. 19

12. Terminal bud lacking, sometimes with two lateral buds at the tip. Papery sack-like capsule remains on during early winter and rattles when shaken ..... **American Bladdernut** (*Staphylea trifolia*) Fig. 20



12. Terminal bud present 13



13. Leaf scars very broad, usually at least ¼ inch across 14

13. Leaf scars narrow, less than ¼ inch across 15

14. Buds ½ to 1 inch long, usually resinous, sometimes nearly black ..... **Horse Chestnut** (*Aesculus hippocastanum*) (Not native) Fig. 21

14. Buds not resinous, brownish ..... **Ohio Buckeye** (*Aesculus glabra*) Fig. 22

20. American Bladdernut (12)



21. Horse Chestnut (14)



22. Ohio Buckeye (14)



15. Buds with two exposed outer scales (sometimes more bud scales are visible below stalked flower bud on flowering dogwood, but actually it has two outer scales).....16

15. Buds with more than two exposed outer scales 19

16. Twigs distinctly purplish (Dogwoods).....17

16. Twigs not purplish, usually has short stubby-looking twigs at almost right angles to main stems 18

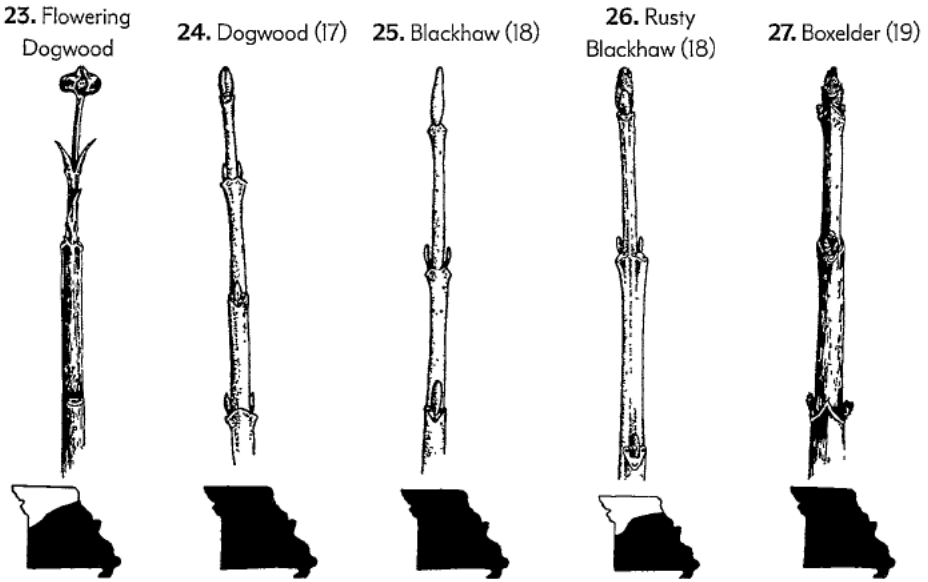
17. With round, stalked flower bud ..... **Flowering Dogwood** (*Cornus florida*) Fig. 23

17. Without flower bud ..... **Dogwoods** (*Cornus spp.)* Fig. 24

18. Buds gray, smooth, or scurfy ..... **Blackhaw** (*Viburnum prunifolium*) Fig. 25

18. Buds velvet-like, dark rusty color ..... **Rusty Blackhaw** (*Viburnum rufidulum*) Fig. 26

19. Twigs green or glaucous ..... **Boxelder** (*Acer negundo*) Fig. 27



19. Twigs brown or reddish 20

20. Buds rounded, often several in cluster (Soft Maples) 21

20. Buds elongated, pointed (Hard Maples) 22

21. Twigs with an unpleasant odor; mature bark usually scaly ..... **Silver Maple** (*Acer saccharinum*) Fig. 28

21. Twigs without an unpleasant odor; trunk bark usually not scaly ..... **Red Maple** (*Acer rubrum*) Fig. 29

22. Twigs pale gray-brown, dull, somewhat stout. Lenticels large, warty ..... **Black Maple** (*Acer nigrum*) (Often indistinguishable from Sugar Maple) Fig. 30

22. Twigs pale reddish-brown, shiny, slender. Lenticels less prominent than Black Maple ..... **Sugar Maple** (*Acer saccharum*) (Often indistinguishable from Black Maple.) Fig. 31

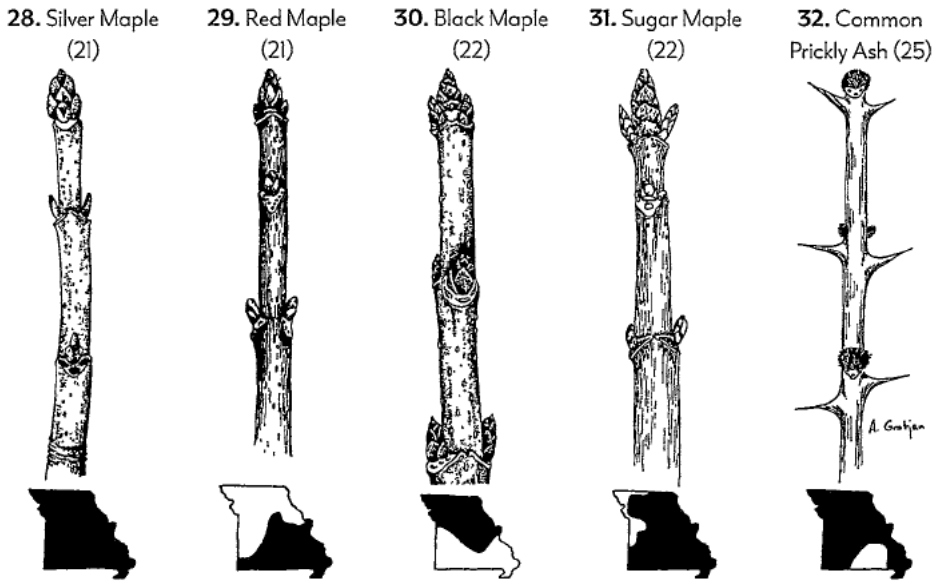
23. Thorns or spines present 24

23. Thorns or spines absent 31

24. Spines in pairs 25

24. Spines solitary, although sometimes branched 26

25. Buds visible, woody, rusty-red. Shrub, not treelike ..... **Common Prickly Ash** (*Zanthoxylum americanum*) Fig. 32



25. Buds embedded in twig ..... (*Robinia pseudoacacia*) Fig. 33

26. Spines scattered all along the twigs and branches. Twigs ½ inch thick or more ..... **Devil's-Walking Stick** (*Aralia spinosa*) Fig. 34

26. Spines not scattered all along the twigs and branches. Twigs less than ½ inch thick 27

27. Thorns usually branched ..... **Thornless Honeylocust** (*Gleditsia triacanthos*) Fig. 35

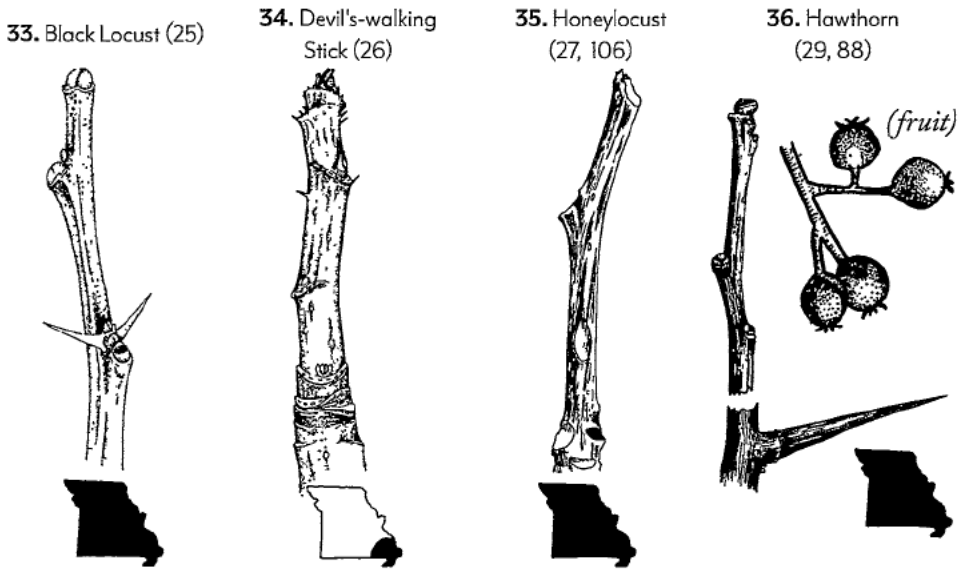
27. Thorns not branched 28

28. Buds pointed at the tip 108

28. Buds more or less rounded at the tip 29

29. Terminal bud absent 30

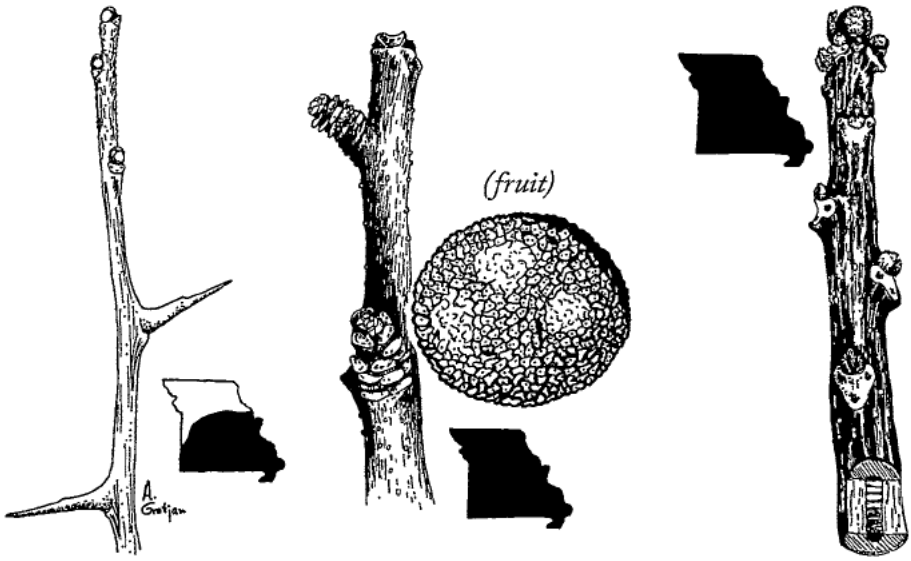
29. Terminal bud present. Small fruits often remain on plant during winter ..... **Hawthorn** (*Crataegus spp.*) Fig. 36



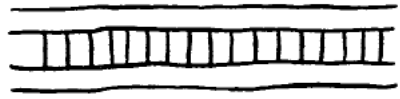
30. Bud scales covered with rusty hairs ..... **Gum Bumelia** (*Bumelia lanuginosa*) Fig. 37

30. Bud scales brown, not covered with rusty hairs, buds rather small. Bark has shreddy orange appearance on mature tree. Sometimes large (3–5 inches in diameter) globose, milky fruits can be found under the tree during winter ..... **Osage-Orange, Hedge Apple** (*Maclura pomifera*) Fig. 38

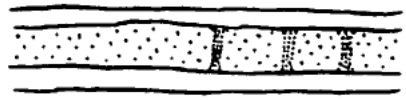
37. Gum Bumelia (30) **38.** Osage-Orange (30) **39.** Black Walnut (33)



31. Pith chambered, at least at the nodes 32



31. Pith solid, although sometimes with diaphragms..... 36



32. Leaf scars three lobed and usually with three groups of bundle scars 33

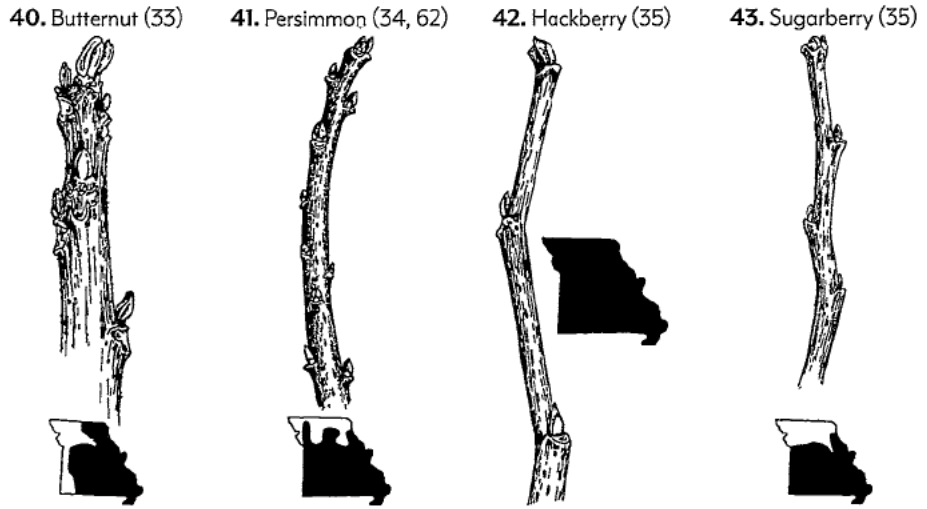
32. Leaf scars half round, not three lobed 34

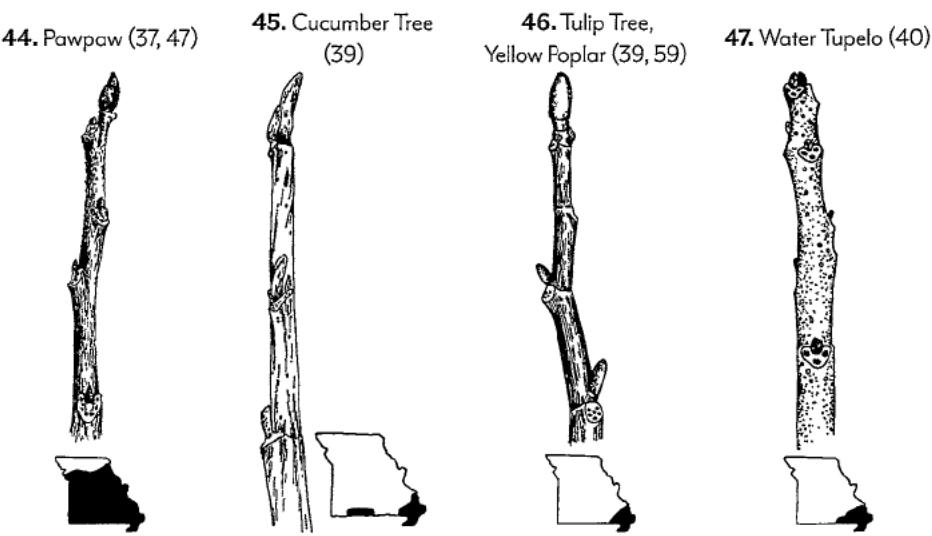
33. Pith pale brown; leaf scars without brown velvety hairs at the top ..... **Black Walnut** (*Juglans nigra*) Fig. 39

33. Pith chocolate-brown; leaf scars with velvety hairs at the top ..... **Butternut** (*Juglans cinerea*) Fig. 40

34. Pith chambered usually only at the nodes; lateral buds pointed; stipular scars present.....35

34. Pith chambered between the nodes as well as at most of the nodes; lateral buds rounded; stipular scar absent ..... **Persimmon** (*Diospyros virginiana*) Fig. 41





35. Buds usually ⅛ inch or longer. Usually many corky projections on tree trunks ..... **Hackberry** (*Celtis occidentalis*) Fig. 42

35. Buds usually less than ⅛ inch long. Usually fewer corky projections on tree trunk ..... **Sugarberry** (*Celtis laevigata*) Fig. 43

36. Pith with diaphragms 37

36. Pith without diaphragms 41

37. Buds without bud scales ..... **Pawpaw** (*Asimina triloba*) Fig. 44

37. Buds with one or more bud scales 38

38. Bud scales one to two; bundle scars seven or more; stipular scars present 39

38. Bud scales three or more; bundle scars three; stipular scars absent ... 40

39. Bud scale one, hairy or fuzzy. Large green, showy buds ..... **Cucumber Tree** (*Magnolia acuminata*) (Other species of magnolia may key out here.) Fig. 45

39. Bud scales two, smooth; duckbill-like bud; stipular scar encircles twig ..... **Tulip Tree** or **Yellow Poplar** (*Liriodendron tulipifera*) Fig. 46

40. Buds up to ⅛ inch long. Easily recognized in natural habitat by its swollen butt ..... **Water Tupelo** (*Nyssa aquatica*) (Swamps and wet sites in Southeast Missouri) Fig. 47

40. Buds greater than 1⅛ inch long ..... **Blackgum** (*Nyssa sylvatica*) (Not in swamps) Fig. 48

41. Leaf scars forming a ring almost completely around the bud. (Bud almost hidden in Thornless Honeylocust) 105

41. Leaf scars not forming a ring around the bud 42

42. Twig distinctly aromatic when cut (Sassafras and Spicebush) 43

42. Twigs not aromatic when cut 44

43. Twigs stout, green; buds generally smooth, solitary ..... **Sassafras** (*Sassafras albidum*) Fig. 49

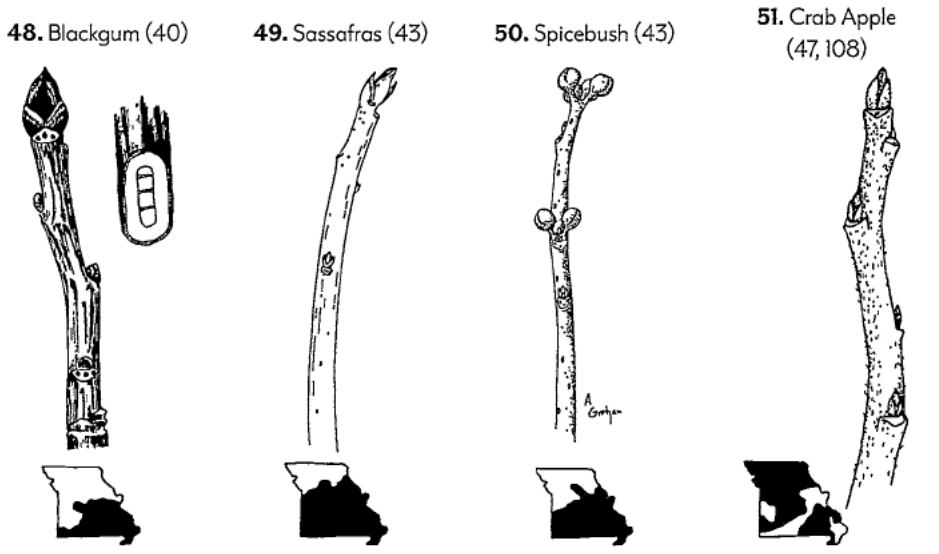
43. Twigs thin, olive brown; flower buds commonly clustered, green, round, and stalked ..... **Spicebush** (*Lindera benzoin*) Fig. 50

44. Buds without scales 45

44. Buds with one or more scales 57

45. Terminal buds larger than the rest of the buds 46

45. Terminal buds smaller than the other buds or absent 53



46. Buds rusty-hairy or gray-wooly 47

46. Buds smooth or, if hairy, not conspicuously rusty-hairy or gray-wooly 48

47. Buds chocolate-brown, rusty-hairy, two to three times longer than broad ..... **Pawpaw** (*Asimina triloba*) Fig. 44

47. Buds gray-wooly, not much longer than board ..... **Crab Apple** (*Malus spp.*) Fig. 51

48. Leaf scars lobed; twigs without stipular scars 49

48. Leaf scars unlobed; twigs with stipular scars 51

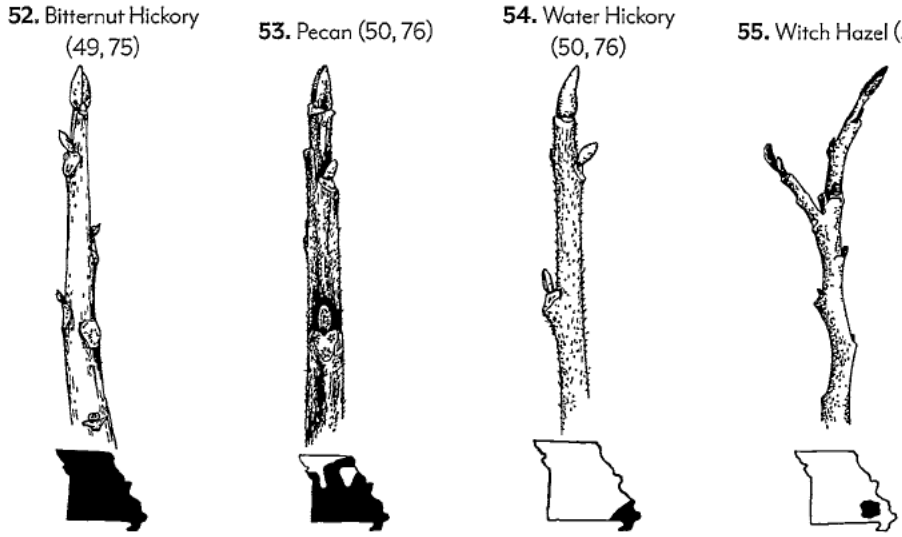
49. Bud bright yellow, sulfur colored, up to ¾ inch long ..... **Bitternut Hickory** (*Carya cordiformis*) Fig. 52

49. Buds brown or reddish-brown 50

50. Terminal bud ¼ to ½ inch long; twigs with orange lenticels ..... **Pecan** (*Carya illinoensis*) Fig. 53

50. Terminal bud up to ¼ inch long; twigs with pale lenticels ..... **Water Hickory** (*Carya aquatica*) (In Missouri, found only in the southeast) Fig. 54

51. Buds pale brown; twigs often zigzag; buds somewhat narrow at the base ..... **Witch Hazel** (*Hamamelis virginiana*) Fig. 55



52. Bitternut Hickory (49, 75)

53. Pecan (50, 76)

54. Water Hickory (50, 76)

55. Witch Hazel (51)

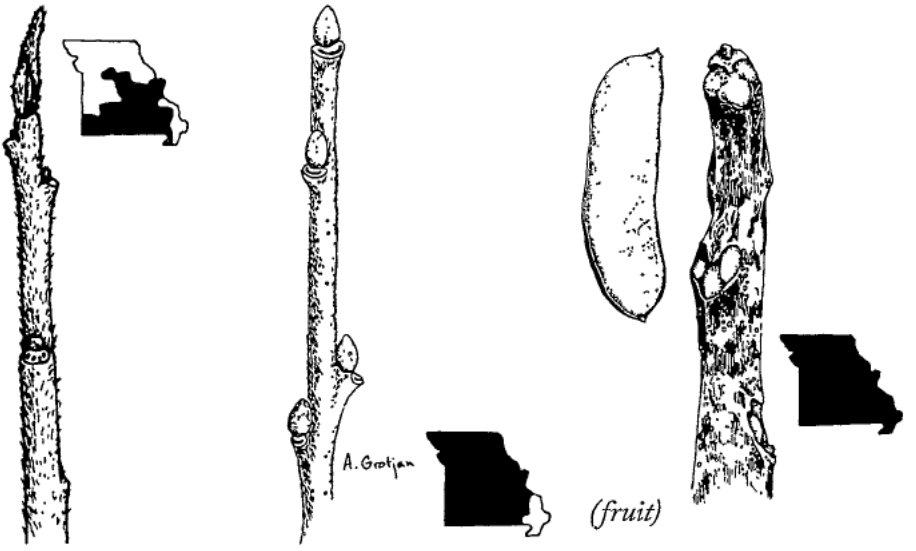
51. Buds light brown; twigs mostly straight 52

52. Seeds three per fruit, not grooved on back; twigs fine hairy; buds buff colored ..... **Carolina Buckthorn** (*Rhamnus caroliniana*) Fig. 56

52. Seeds two per fruit, grooved on back; twigs undersides typically hairy ..... **Lanced Leaved Buckthorn** (*Rhamnus lanceolata*) Fig. 57

53. Pith reddish-brown; leaf scars greater than ¼ inch across. Large pods sometimes remain on tree during early winter ..... **Kentucky Coffeetree** (*Gymnocladus dioicus*) Fig. 58

56. Carolina Buckthorn (52) **57.** Lance Leaved Buckthorn (52) **58.** Kentucky Coffeetree (53)



53. Pith not reddish-brown, leaf scars less than ¼ inch across 54

    54. Milky sap present 55

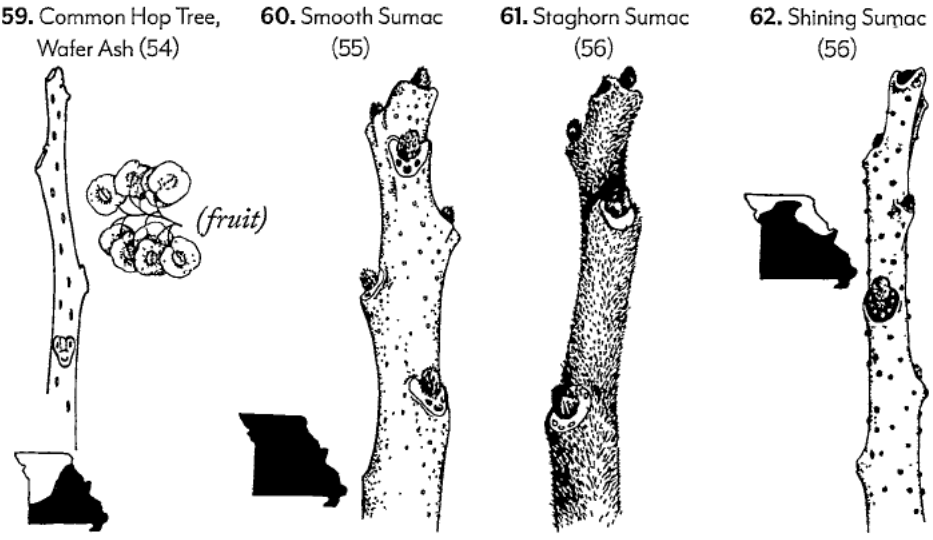
    54. Milky sap absent. Flat, round, papery "hops" hang on tree in winter ..... **Common Hop Tree,** sometimes called **Wafer Ash** (*Ptelea trifoliata*) Fig. 59

55. Twigs hairy 56

55. Twigs smooth ..... **Smooth Sumac** (*Rhus glabra*) Fig. 60

    56. Twigs velvety; pithy yellow ..... **Staghorn Sumac** (*Rhus typhina*) (Not native) Fig. 61

    56. Twigs not velvety; pith whitish ..... **Shining Sumac** (*Rhus copallina*) Fig. 62



57. Buds with one scale (sometimes looks like two scales but comes off like a hood) ..... **Willow** (*Salix spp.*) Fig. 63

57. Buds with two more scales 58

58. Stipule scars encircling the twig 59

58. Stipule scars not encircling the twig 60

59. Bud with two scales, looks like a duck's bill. Stipule scar encircles the twig ..... **Yellow Poplar** or **Tuliptree** (*Liriodendron tulipifera*) Fig. 46

59. Bud with more than two bud scales, long narrow and pointed. Back is thin, smooth, and light gray ..... **American Beech** (*Fagus grandifolia*) (European Beech, *F. sylvatica*, while not native, is a common ornamental) Fig. 64

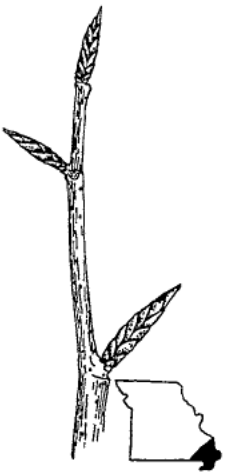
60. Trunk bark, red-brown; silver-yellow to copper-red flakes peeling from bark, giving a ragged appearance. Usually found growing in moist bottomland. Thin, hairy twigs ..... **River Birch** (*Betula nigra*) Fig. 65

60. Not as above 61

63. Willow (57)



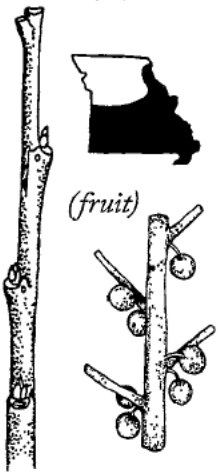
64. American Beech (59)



65. River Birch (60, 95)



66. Deciduous Holly (62)



61. Bundle scar one..... 62

61. Bundle scar two or more..... 63

62. Twigs with short spurlike shoots. Sometimes four-seeded red berries remain on during winter ..... **Deciduous Holly** (*Ilex decidus*) Fig. 66

62. Twigs without short spurlike shoots. Bark on older trees dark and blocky looking ..... **Persimmon** (*Diospyros virginiana*) Fig. 41

63. Buds at least four times longer than broad 64

63. Buds less than four times longer than broad.....65

64. Lowermost bud scale directly above the leaf scar. Twigs yellow-brown; buds often resinous ..... **Cottonwood** (*Populus deltoides*) Fig. 67



64. Lowermost bud scale to one side of leaf scar. Twigs reddish-brown, with pale lenticels; buds not resinous ..... **Downy Serviceberry** (*Amelanchier arborea*) Fig. 68



67. Cottonwood (64, 71)



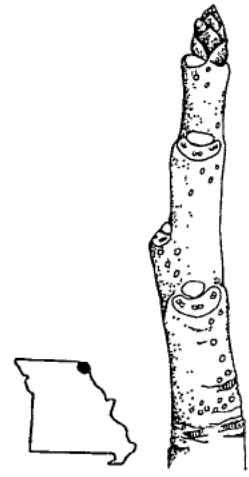
68. Down Serviceberry (64)



69. White Poplar (67)



70. Largetooth Aspen (69)



65. Pith star-shaped, or triangular, or variously lobed in cross section (Sometimes looks almost round in hickories, but usually lobed) 66

65. Pith round or nearly so in cross section 85

66. Lowermost bud scale directly above the leaf scar.....67

66. Lowermost bud scale or scales to one side of the leaf scar (Hard to see on oaks)..... 72

67. Twigs densely hairy, bark white ..... **White Poplar** (*Populus alba*) (Not native) Fig. 69

67. Twigs smooth or sparely hairy..... 68

68. Visible bud scales more than four..... 69

68. Visible bud scales three to four.....71

69. Buds smooth, shiny..... 70

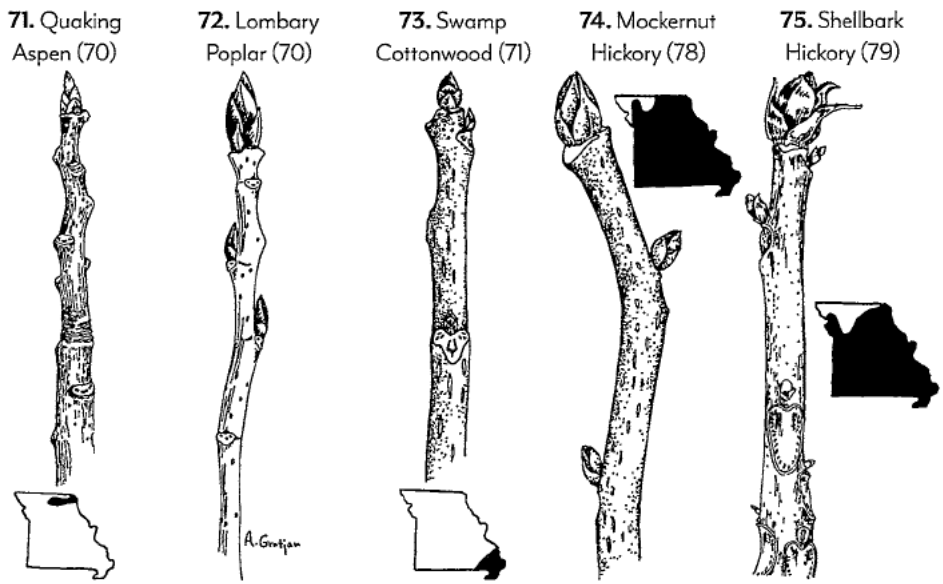
69. Buds hairy, dull, gray ..... **Largetoothed Aspen** (*Populus grandidentata*) Fig. 70

70. Buds flat against twigs, sometimes gummy ... **Quaking Aspen** (*Populus tremuloides*) Fig. 71

70. Buds not flat against twigs, not gummy. Tall, slender ornamental ..... **Lombardy Poplar** (*Populus nigra* var. *italica*) (Not native) Fig. 72

71. Buds ½ inch long or longer. Twigs four angled or with four longitudinal lines ..... **Eastern Cottonwood** (*Populus deltoides*) Fig. 67

71. Buds less than ½ inch long ..... **Swamp Cottonwood** (*Populus heterophylla*) Fig. 73



72. Buds clustered near the tip of the twig; bud scales in five rows; pith distinctly star-shaped in cross section ..... **Oaks** (*Quercus spp.*) Group C.

72. Buds not clustered near the tip of the twig; bud scales not in five rows; pith variously lobed or triangular in cross section (May appear almost round in hickories) 73

73. Bundle scales in more than three groups, leaf scars lobed 74

73. Bundle scales in three groups; leaf scars not lobed 81

74. Visible bud scales two 75

74. Visible bud scales more than two 77

75. Buds bright yellow ..... **Bitternut Hickory** (*Carya cordiformis*) Fig. 52

75. Bud scales brown or reddish-brown 76

76. Terminal bud ¼ to ½ inch long; twigs with pale lenticels ..... **Pecan** (*Carya illinoensis*) Fig. 53

76. Terminal bud up to ¼ inch long; twigs with pale lenticels ..... **Water Hickory** (*Carya aquatica*) (Found in swamps in extreme southeastern parts of Missouri) Fig. 54

77. Some or all the terminal buds ½ inch long or longer 78

77. Terminal buds usually less than ½ inch long 80

78. Outermost buds scales falling away easily, revealing pale inner scales; bark not peeling ..... **Mockernut Hickory** (*Carya tomentosa*) Fig. 74

78. Outermost buds scales persistent; bark peeling 79

79. Twigs orange-brown with orange lenticels ..... **Shellbark Hickory** (*Carya laciniosa*) Fig. 75

79. Twigs dark brown or red-brown with pale lenticels ..... **Shagbark Hickory** (*Carya ovata*) Fig. 76

80. Buds rusty-hairy with silvery or yellow scales ..... **Black Hickory** (*Carya texana*) Fig. 77

80. Buds smooth or only slightly hairy, without scales. Bark smooth or furrowed, not scaly ..... **Pignut Hickory** (*Carya glabra*) Fig. 78

81. Buds up to 3⁄16 inch long, twigs bitter to the taste 82

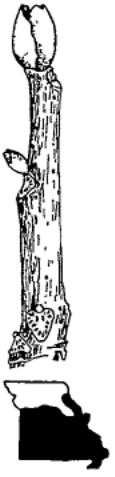
81. Buds longer than 3⁄16 inch; twigs not bitter to the taste 84

82. Pith triangular in cross section, buds stalked; the fruit is a small, woody cone ..... **Common Alder** (*Alnus serrulata*) Fig. 79

76. Shagbark Hickory (79)



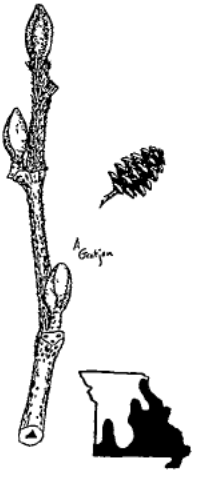
77. Black Hickory (80)



78. Pignut Hickory (80)



79. Common Alder (82)



82. Pith not triangular in cross section 83

83. Buds very shiny. Horizontal lenticels on trunk bark usually visible ..... **Black Cherry** (*Prunus serotina*) Fig. 80

83. Buds pointed, reddish-brown, smooth, hairy ..... **American Plum** (*Prunus americana*) Fig. 81

84. Twigs sometimes with corky wings; buds with four or more exposed scales. Bark on trunk usually corky ..... **Sweetgum** (*Liquidambar styraciflua*) Fig. 82

84. Twigs without corky wings; buds with two to three exposed scales ..... **Ozark Chinquapin** (*Castanea pumila* var. *ozarkensis*) Fig. 83

85. Terminal bud present 86

85. Terminal bud absent (sometimes hard to tell in hazel). Bud on twig tip looks lopsided 89

86. Visible bud scales two to three 87

86. Visible bud scales four or more 88

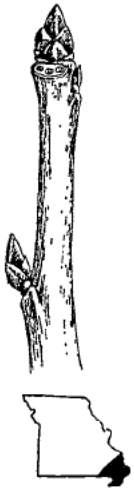
80. Black Cherry (83)



81. American Plum (83)



82. Sweetgum (84)



83. Ozark Chinquapin (84)



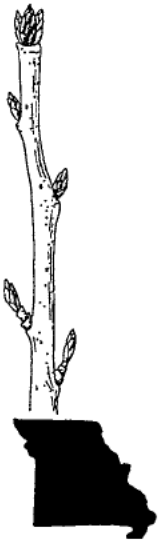
84. Smoke Tree (87)



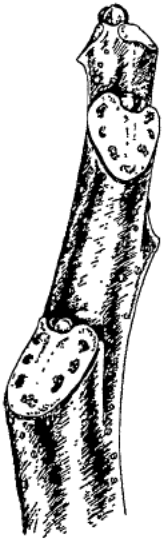
85. Alternateleaf Dogwood (87)



86. Wild Plum (88, 109)



87. Tree-of-Heaven (89)



88. Eastern Redbud (91)



87. Bud up to ⅛ inch long ..... **Smoke Tree** (*Cotinus obovatus*) Fig. 84

87. Buds ⅛ to ¼ inch long ..... **Alternateleaf Dogwood** (*Cornus alternifolia*) Fig. 85

88. Bud scales fleshy ..... **Hawthorn** (*Crataegus spp.*) Fig. 36

88. Bud scales not fleshy ..... **Wild Plum** (*Prunus spp.*) Fig. 86

89. Leaf scars at least ⅜ inch across; bundle scars nine ..... **Tree-of-Heaven** (*Ailanthus altissima*) (Not native) Fig. 87

89. Leaf scars less than ⅜ inch across; bundle scars not nine 90

90. Stipular scars absent 91

90. Stipular scars present 92

91. Small, inconspicuous, hairless buds; sometimes reddish flower buds are not so inconspicuous ..... **Eastern Redbud** (*Cercis canadensis*) Fig. 88

91. Buds hairy or fuzzy ..... **Western Soapberry** (*Sapindus saponaria* var. *drummondii*) Fig. 89

92. Exposed bud scales two 93

92. Exposed bud scales three or more 94

93. Twigs gray or brown; reddish buds ..... **American Basswood** (*Tilia americana*) Fig. 90

93. Twigs light red ..... **White Basswood** (*Tilia aermicana* var. *heterophylla*) Fig. 91

94. Exposed bud scales three to four; lenticels linear 95

94. Exposed bud scales more than four; lenticels more or less circular ... 96

95. Twigs and buds smooth; bark white ..... **Paper Birch** (*Betula papyrifera*) (Not native) Fig. 92

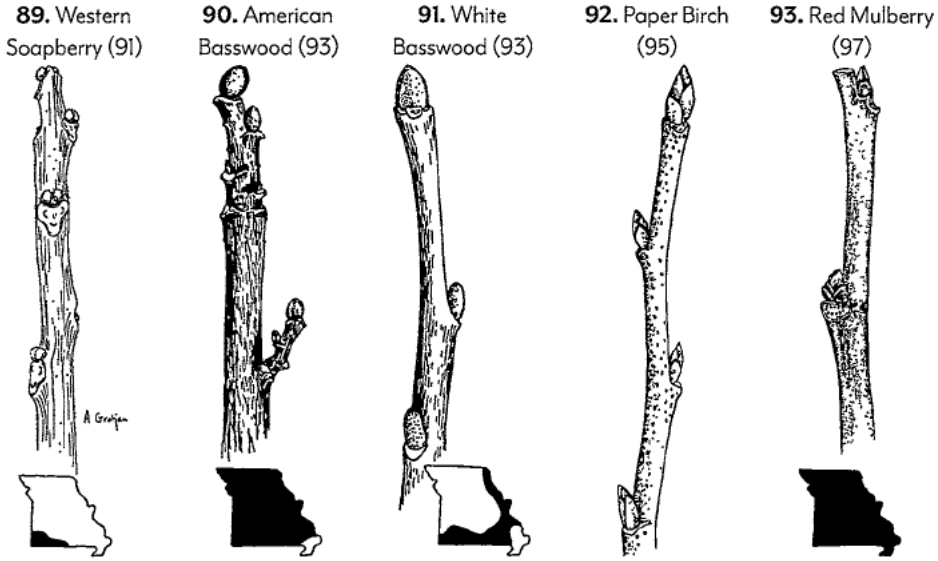
95. Twigs and buds somewhat hairy, bark reddish, peeling ..... **River Birch** (*Betula nigra*) Fig. 65

96. Bundle scars not three; milky sap present, bud scales distinctly two-toned, green and brown 97

96. Bundle scars three; milky sap absent, but scales usually not two-toned 98

97. Buds usually ¼ inch long ..... **Red Mulberry** (*Morus rubra*) Fig. 93

97. Buds usually less than ¼ inch long ..... **White Mulberry** (*Morus alba*) (Not native) Fig. 94



98. Exposed bud scales usually about 12; trunk resembles gray stone sculptured into muscles and sinews ..... **Blue Beech** or **Musclewood** (*Carpinus caroliniana*) Fig. 95

98. Exposed bud scales, usually about six 99

99. Buds globe-shaped, blunt; catkins often dangle from twigs in winter ..... **American Hazel** (*Corylus americana*) Fig. 96

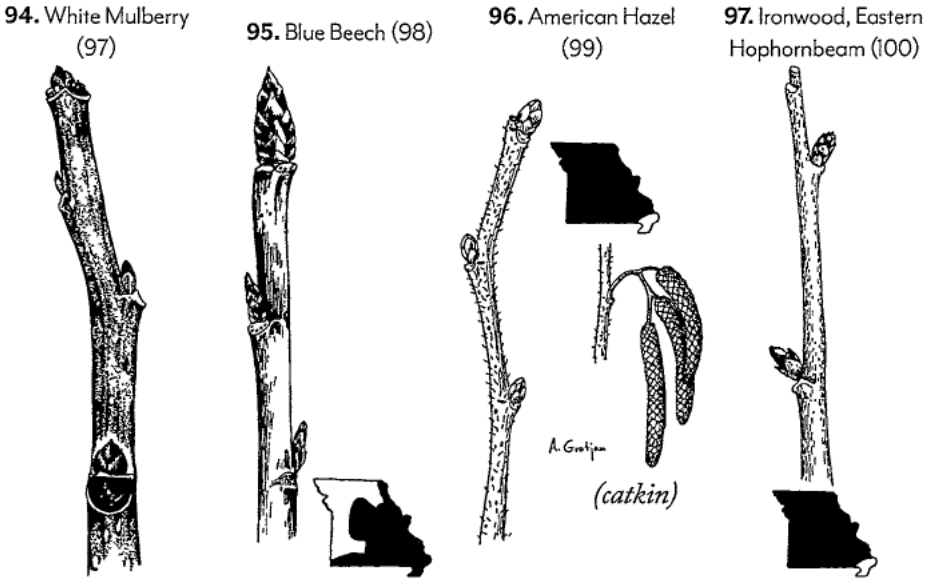
99. Buds somewhat pointed 100

100. Leaf scars and bundle scars slightly elevated; buds striated; shreddy bark, peeling vertically in half-inch strips ..... **Ironwood** or **Eastern Hophornbeam** (*Ostrya virginiana*) Fig. 97

100. Leaf scars and bundle scars depressed 101

101. Buds less than ⅛ inch long ..... **Siberian Elm** (*Ulmus pumila*) (Not native) Fig. 98

101. Buds ⅛ inch long or longer 102



102. Some of the twigs have corky wings 103

102. None of the twigs have corky wings 104

103. Buds usually ¼ inch long ..... **Rock Elm** (*Ulmus thomasii*) Fig. 99

103. Buds usually less than ¼ inch long ..... **Winged Elm** (*Ulmus alata*) Fig. 100

104. Buds rusty-hairy, about ¼ inch long. Trunk bark does not usually show darker and lighter layers of bark when sliced with a knife ..... **Slippery Elm** (*Ulmus rubra*) Fig. 101

104. Buds light brown, smooth, about ⅛ inch long. Trunk bark usually shows dark and lighter layers of bark when sliced with a knife ..... **American Elm** (*Ulmus americana*) Fig. 102

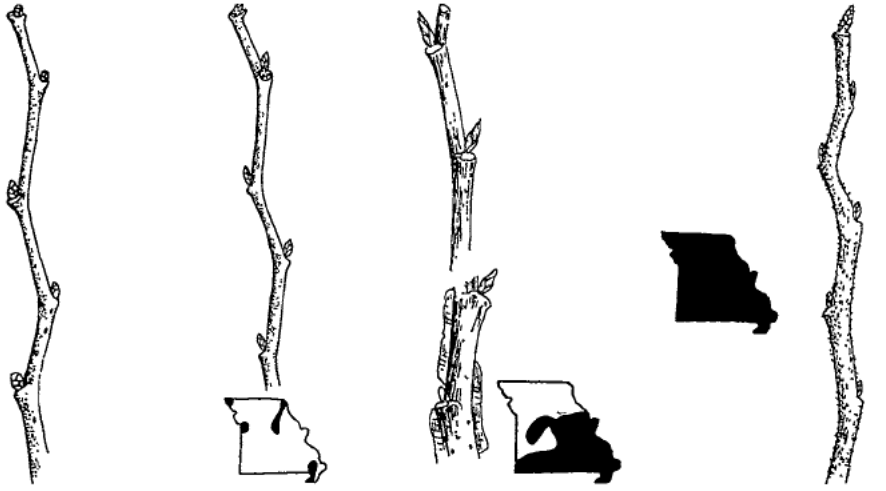
105. Buds hairy 107

105. Buds not hairy 106

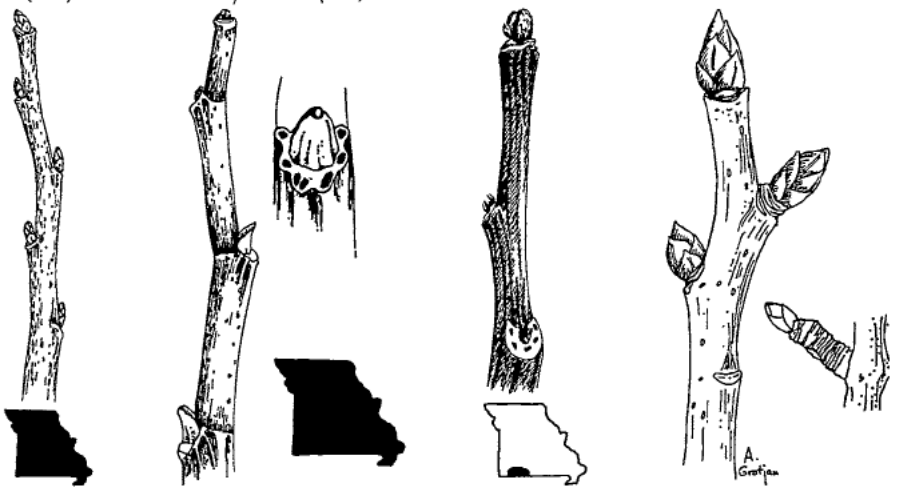
106. Buds clearly visible, stipular scars encircle the twig ..... **Sycamore** (*Platanus occidentalis*) Fig. 103

106. Buds mostly hidden in leaf scars, stipular scar does not encircle the twig ..... **Thornless Honeylocust** (*Gleditsia triacanthos* var. *inermis*) (Ornamental variety of native Honeylocust) Fig. 35

98. Siberian Elm (101) **99.** Rock Elm (103) **100.** Winged Elm (103) **101.** Slippery Elm (104)



102. American Elm (104) **103.** American Sycamore (106) **104.** Yellowwood (107) **105.** Pear (109)



107. Most twigs ⅜ inch thick or more ..... **Sumac** (*Rhus spp.*) Fig. 60–62

107. Twigs less than ⅜ inch thick ..... **Yellowwood** (*Cladrastis kentukea*) (In Missouri, occurs naturally in the extreme southwest) Fig. 104

    108. Buds and twigs fuzzy, covered with grayish-white hair ..... **Apple** (*Malus spp.*) Fig. 51

    108. Buds and twigs not fuzzy.....109

109. Fine, slender twigs about ⅛ inch thick; end bud false ..... **Wild Plum** (*Prunus spp.*) Fig. 86

109. Course or stout twigs, usually ¼ inch thick ..... **Pear** (*Pyrus communis*) Fig. 86

GROUP C: OAKS

1. Terminal buds at least ¼ inch long or longer 2

1. Terminal buds less than ¼ inch long 5

    2. Most terminal buds about ⅜ inch long or longer, distinctly five-angled in cross section; buds with fine hairs, velvety 3



    2. Most terminal buds close to ¼ inch long (3⁄16–5⁄16 inch) 10

3. Stipules near terminal buds; twigs often with warty lenticels; corky ridges on older stems, dull, gray. Bark on older tree deeply furrowed ..... **Bur Oak** (*Q. macrocarpa*) Fig. 106

3. Terminal buds without conspicuous stipules; lenticels small; twigs without corky ridges, brown or red-brown 4

    4. Buds gray to brown, wooly; twigs shiny ..... **Black Oak** (*Q. velutina*) Fig. 107

    4. Buds red-brown, wooly ..... **Blackjack Oak** (*Q. marilandica*) Fig. 108

5. Buds rounded, mostly about ⅛ inch long or less 6

5. Buds pointed 16

    6. Most twigs slender to moderate, smooth (without hair) 7

    6. Twigs stout, two types; 1) with corky ridges and not dusty-looking or 2) without corky ridges and dusty-looking 9

7. Buds hairy ..... **Overcup Oak** (*Q. lyrata*) (In Missouri, found naturally only in the southeast) Fig. 109

7. Buds not hairy 8

106. Bur Oak (3, 9, 13, 18)



107. Black Oak (4)



108. Black Jack Oak (4)



8. Twigs and buds dark red-brown, sometimes almost purplish. Bark on young branches not peeling off in large flakes ..... **White Oak** (*Q. alba*) Fig. 110

8. Twigs and buds light brown. Bark on young branches peeling off in large flakes ..... **Swamp White Oak** (*Q. bicolor*) Fig. 111

9. Buds red-brown; twigs dusty-looking ..... **Post Oak** (*Q. stellata*) Fig. 112

9. Buds gray with fine gray hairs; twigs not dusty-looking, sometimes with warty lenticels or corky ridges ..... **Bur Oak** (*Q. macrocarpa*) Fig. 106

10. Buds with short fine hair..... 13

10. Buds not hairy.....11

11. Buds distinctly straw-colored (pale brown); twigs greenish brown to brown. Leaves lobed with bristle tips ..... **Shumard Oak** (*Q. shumardii*) Fig. 113

11. Buds reddish 12

12. Twigs red-brown, almost purplish ..... **Northern Red Oak** (*Q. rubra*) Fig. 114

12. Twigs dusty-looking ..... **Post Oak** (*Q. stellata*) Fig. 112

13. Stipules near end buds; corky ridges on older stems; warty lenticels on twigs ..... **Bur Oak** (*Q. macrocarpa*) Fig. 106

13. Without stipules or corky ridges on twigs or stems 14

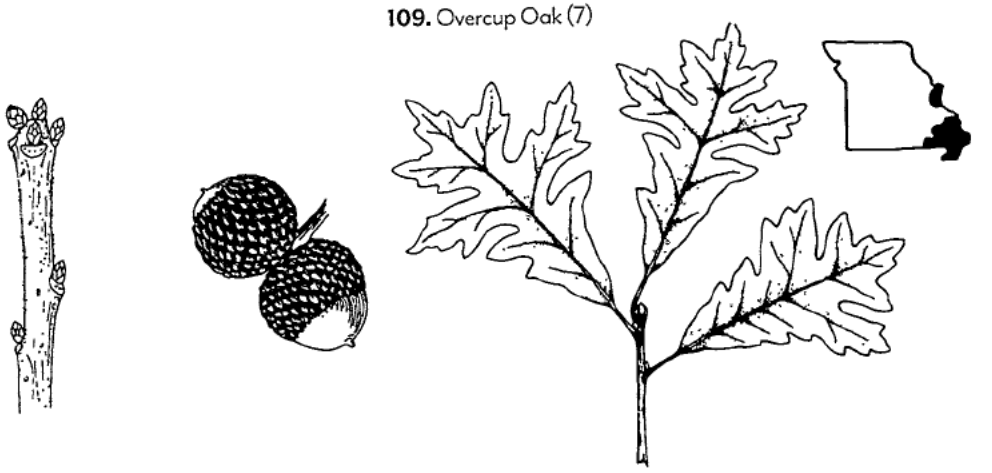
14. Twigs dusty-looking, brown to yellow-brown ..... **Post Oak** (*Q. stellata*) Fig. 112

14. Twigs shiny, reddish-brown (in southeastern counties).....15

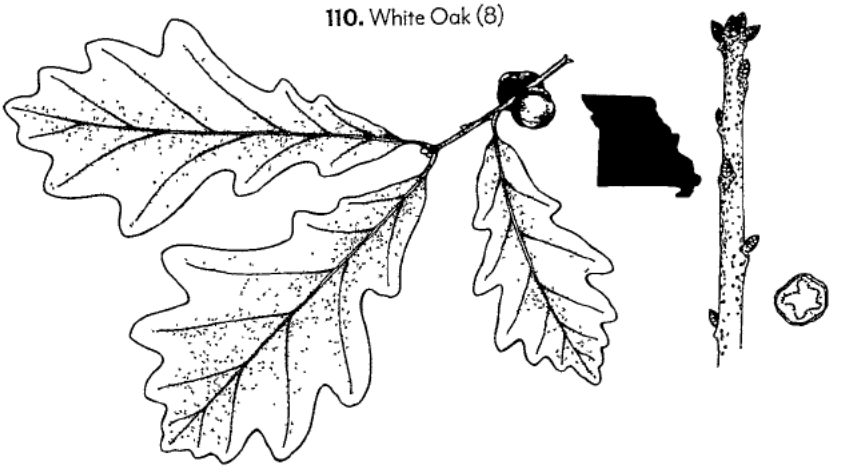
15. Bud scales white-hairy only near tip, acorn with concentric rings near tip ..... **Scarlet Oak** (*Q. coccinea*) (In Missouri, found naturally in the southeast) Fig. 115

15. Bud reddish-brown, covered with fine, rusty hair ..... **Southern Red Oak** (*Q. falcata*) (In Missouri, found only in the southeast) Fig. 116

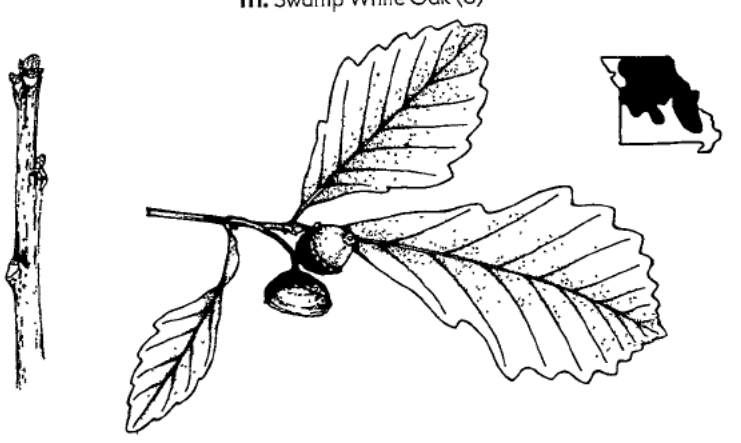
109. Overcup Oak (7)



110. White Oak (8)



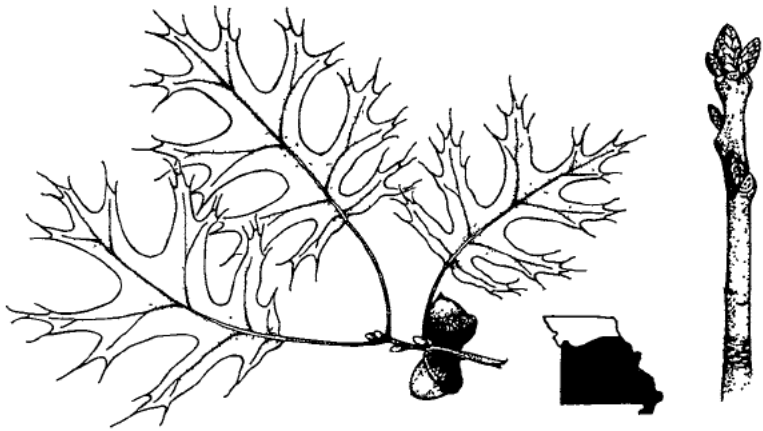
111. Swamp White Oak (8)



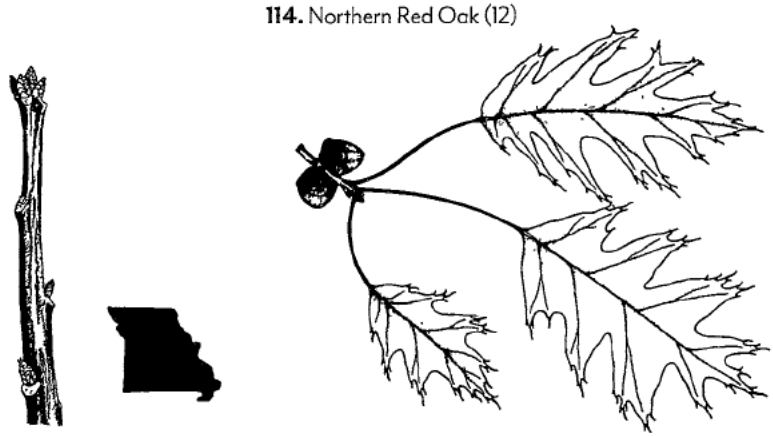
112. Post Oak (9, 12, 14)



113. Shumard Oak (11, 17)



114. Northern Red Oak (12)



16. Buds covered with short, fine hair (Use a hand lens to check.)..... 18

16. Buds definitely not covered with hair.....17

17. Buds straw-colored (light brown), twigs greenish-brown to brown. Leaves lobed with bristle tips ..... **Shumard Oak** (*Q. shumardii*) Fig. 113

17. Buds reddish-brown or dark brown.
..... **Shingle Oak** (*Quercus imbicaria*) (Narrow, unlobed leaves) Fig. 117
..... **Pin Oak** (*Q. palustris*) (Leaves lobed with bristle tips) Fig. 118
..... **Willow Oak** (*Q. phellos*) (In Missouri, found only on the southeast) Fig. 119
..... **Water Oak** (*Q. nigra*) (In Missouri, found only in the extreme southeast) Fig. 120
These species may be distinguished by their leaves, if present.

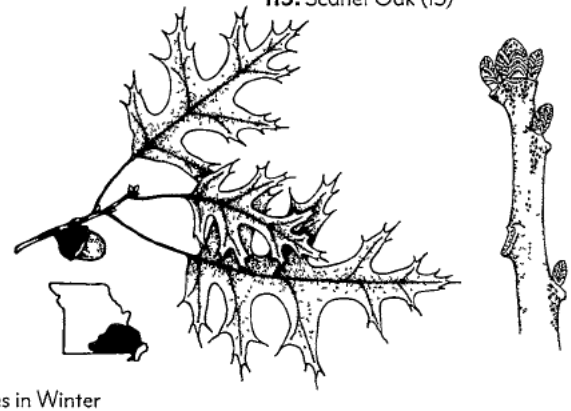
18. Stipules near terminal buds. Corky ridges on older stems. Warty lenticels on twigs ..... **Bur Oak** (*Q. macrocarpa*) Fig. 106

18. Without stipules, corky ridges, or warty lenticels 19

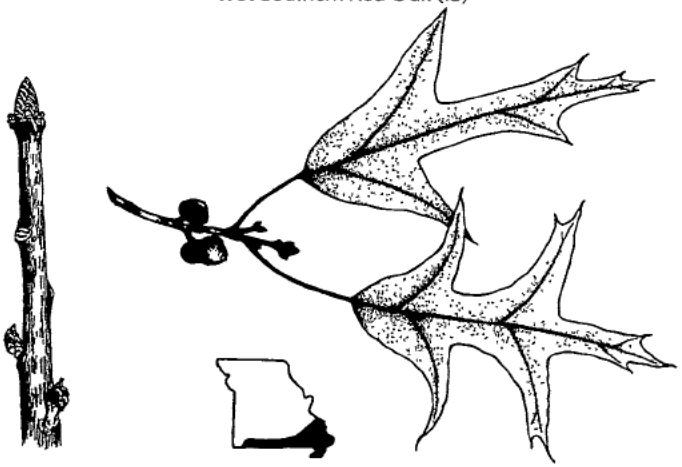
19. Bud scales gray margined ..... **Chinquapin Oak** (*Q. muehlenbergii*) Fig. 121

19. Buds with fine hair all over.
..... **Cherrybark Oak** (*Q. pagoda*) Fig. 122
..... **Swamp Chestnut Oak** (*Q. michauxii*) Fig. 123
Both found naturally in Missouri only in the southeast. These species may be distinguished by their leaves if present.

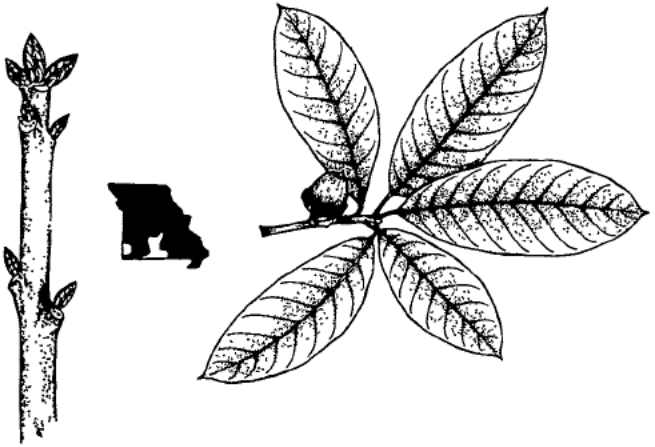
115. Scarlet Oak (15)



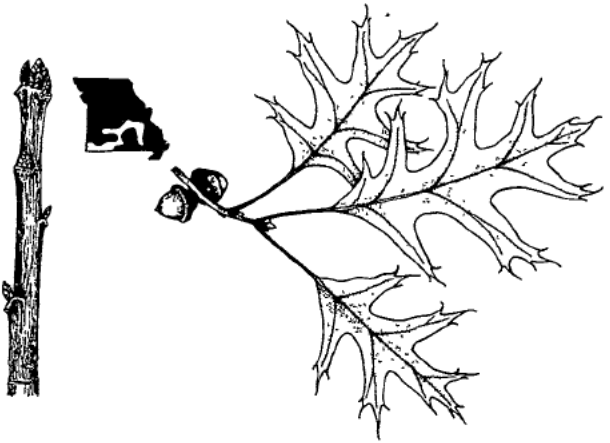
116. Southern Red Oak (15)



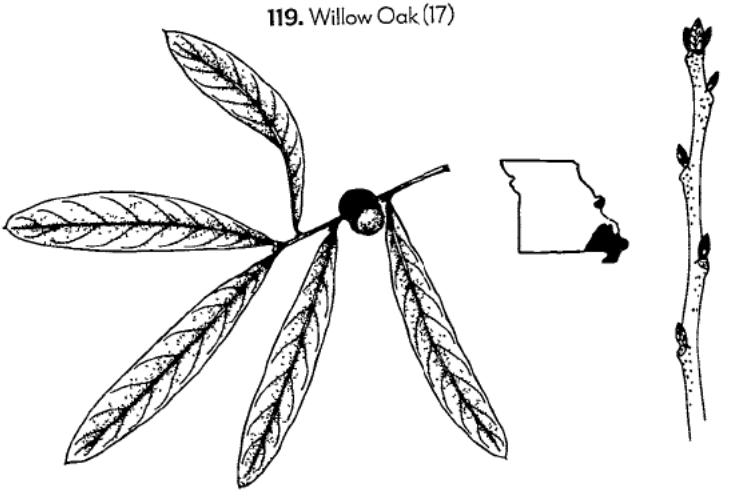
117. Shingle Oak (17)



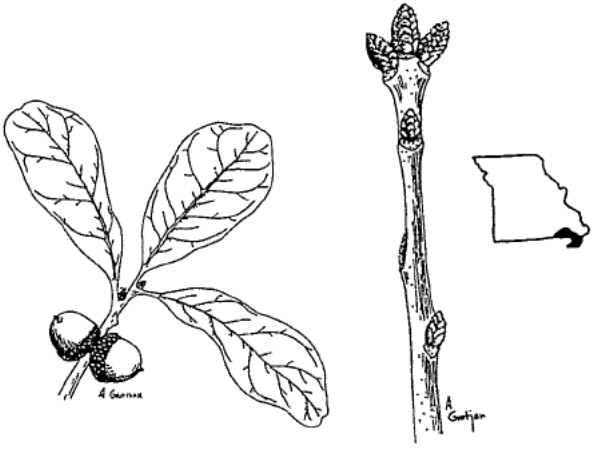
118. Pin Oak (17)



119. Willow Oak (17)



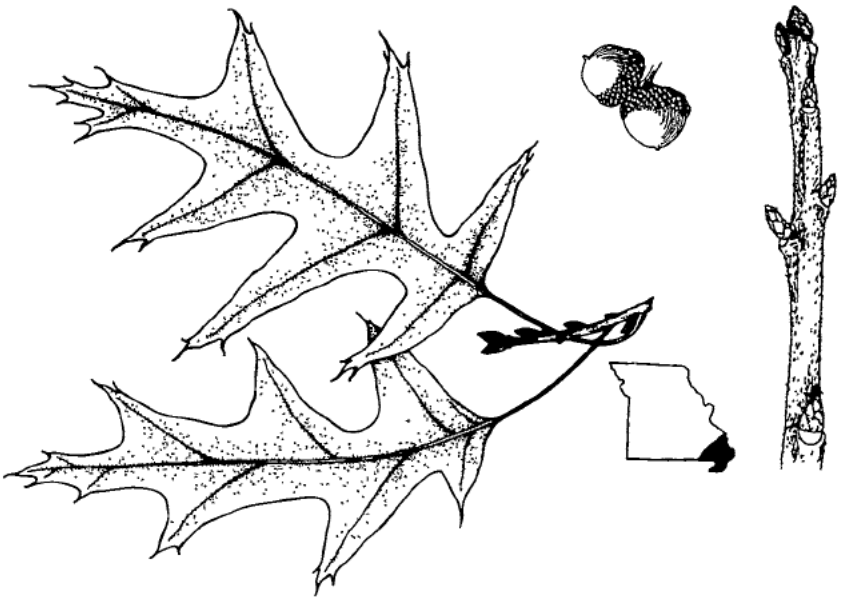
120. Winter Oak (17)



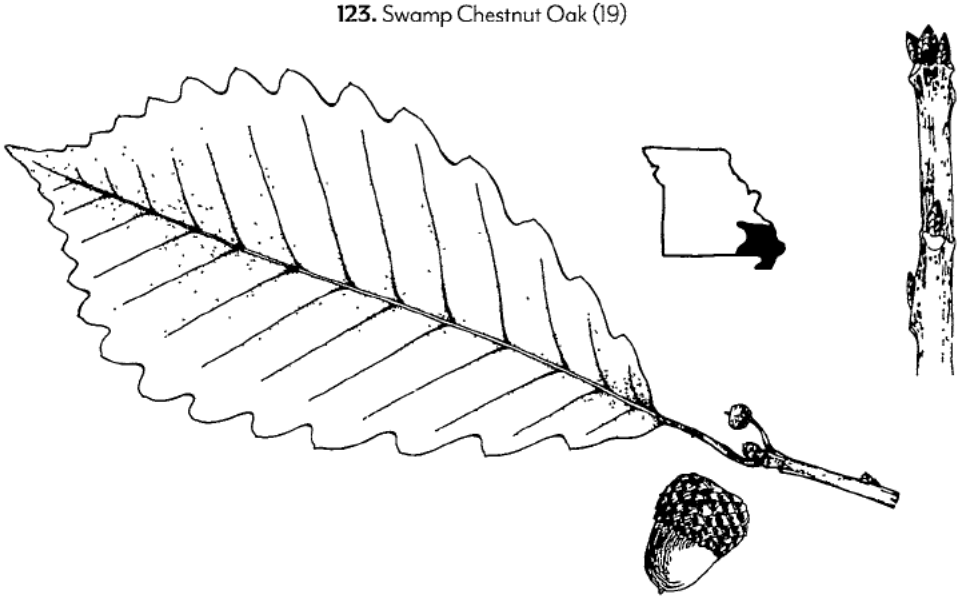
121. Chinquapin Oak (19)



122. Cherrybark Oak (19)



123. Swamp Chestnut Oak (19)



GLOSSARY

alternate — leaf scars occurring one per node.

axillary — borne directly in upper angle between leaf and twig (axil).

berry — small, fleshy fruit.

bud — minute stem bearing next year's leaves or flowers in a small cluster. May or may not be covered by one or more scales.

bud scale — scales surrounding buds in most trees, protecting smaller inner leaves.

bundle scar — small dots or lines on a leaf scar where vascular tissue transported sap from leaf to twig.

capsule — a dry, papery fruit type that may persist in the winter.

chambered pith — pith hollow, divided into small chambers by thin transverse partitions.

catkin — a cylindrical, pendulous cluster of flowers.

cone scale — hard, protective scales on evergreen cones. Seeds are borne on the inner surface of these scales.

continuous pith — pith solid, not interrupted by cavities.

depressed — in a shallow cavity.

diaphragmed pith — pith solid but transversed at short intervals by bars of denser (usually darker) tissue.

glaucous — covered with a white or bluish bloom which can be rubbed off easily.

globose — spherical.

lateral buds — buds appearing along the sides of the twig.

leaf scar — the scar left on the twig at the point of attachment of a leaf to the twig.

lenticels — small areas of loose tissue appearing as dots or warts on the surface of the twig.

naked bud — a bud without scales. Often the outer pair of leaves will appear similar to scales.

node — swollen portion of the twig which bears leaves and buds.

opposite — leaf scars occurring in pairs on opposite sides at each node.

pith — central cylinder of tissue in the twig. Usually differs in color and texture from other wood.

resinous — slightly sticky, covered with resin.

scurfy — roughened or scaly.

sheath — a transparent papery sheath at the base of a cluster of needles in pines.

spines — sharp, needle-like, unbranched projections from the twig, sometimes paired at the node (modified stipules).

spur-shoots — short, stubby twigs with crowded leaf scars and very slow growth.

stalked bud — a bud occurring at the end of a small stem or stalk.

stipules — small, leaf-like structures occurring in pairs on either side of leaves.

stipule-scars — small marks left by stipules after they drop off.

striated — marked with fine, long longitudinal lines or ridges.

terminal bud — bud at the end of a twig.

thorns — sharp, branched or unbranched outgrowths of twigs.

whorled — leaf scars occurring three per node.

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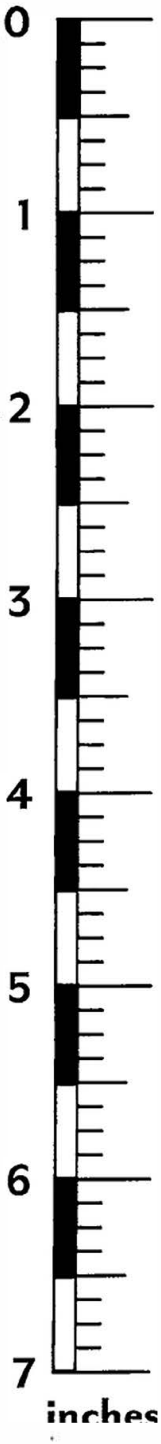
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